I claim:

1. A semiconductor processing apparatus comprising:

a housing defining a processing chamber therein, said processing chamber being adapted to support a semiconductor substrate therein;

means for applying a first energy to a non-device side of the semiconductor substrate and for applying a pulse energy to a device side of the semiconductor substrate wherein the intensity of the first energy is less than said pulse energy, and the duration of the pulse energy is less than the duration of the first energy to control the depth of the junctions formed by impurities implanted in the semiconductor substrate and control the diffusion of the impurities through the substrate.

2. The semiconductor processing apparatus according to Claim 1, wherein the duration of said pulse energy is in a range of about 1 microsecond to 2 seconds.

3. The semiconductor processing apparatus according to Claim 3, wherein the duration of said pulse energy is in a range of about 100 milliseconds to 400 milliseconds.

4. The semiconductor processing apparatus according to Claim 1, wherein said means for applying comprises a first energy source and a second energy source, said first energy source for applying said first energy to the non-device side of the semiconductor substrate, and said second energy source for applying said pulse energy to the device side of the substrate.

5. The semiconductor processing apparatus according to Claim 4, wherein said first energy source generates a peak energy at a wavelength in a range of about 0.2 microns to 3.0 microns.

6. The semiconductor processing apparatus according to Claim 5, wherein said first energy source comprises at least one tungsten halogen lamp.

7. The semiconductor processing apparatus according to Claim 6, wherein said first energy source comprises a plurality of tungsten halogen lamps.

8. The semiconductor processing apparatus according to Claim 7, wherein each of said lamps has a longitudinal extent, said longitudinal extents of a first group of lamps being generally parallel with the non-device side of the semiconductor substrate and being positioned at a first spacing from the non-device side of the semiconductor substrate and aligned over a perimeter region of the substrate to heat the perimeter region of the semiconductor substrate, said first group of heating lamps defining a first heating zone, a second group of said lamps positioned at a second spacing from the non-device side of the semiconductor substrate and positioned to extend across the substrate to heat a central region of the semiconductor substrate, said second group defining a second heating zone, and wherein said first spacing is less than said second spacing to create a varying temperature profile which is applied to the non-device side of the substrate.

9. The semiconductor processing apparatus according to Claim 4, wherein said second energy source generates a peak energy at a wavelength in a range of about 0.2 microns to 0.9 microns.

10. The semiconductor processing apparatus according to Claim 9, wherein said second energy source comprises at least one lamp chosen from a tungsten halogen lamp and a xenon lamp.

11. The semiconductor processing apparatus according to Claim 9, wherein said second energy source comprises at least one lamp tungsten halogen lamp.

12. The semiconductor processing apparatus according to Claim 11, wherein said second energy source comprises a plurality of tungsten halogen lamps.

13. The semiconductor processing apparatus according to Claim 11, further comprising a filter, said filter absorbing energy from said second energy source having a wavelength greater than about 0.7 microns.

14. The semiconductor processing apparatus according to Claim 13, said filter absorbing energy from said second energy source having a wavelength greater than about 0.9 microns.

15. The semiconductor processing apparatus according to Claim 13, wherein said filter comprises a fluid cooled filter.

16. The semiconductor processing apparatus according to Claim 10, wherein each of said lamps has a longitudinal extent, said longitudinal extents of a first group of lamps being generally parallel with the device side of the semiconductor substrate, said first group of heating lamps defining a first heating zone, a second group of said lamps being generally parallel to the device side of the substrate, said second group defining a second heating zone, and wherein said first group and said second group are independently controlled to selectively energize said lamps.

17. A semiconductor processing apparatus comprising:

a housing defining a processing chamber therein, said processing chamber being adapted to support a semiconductor substrate therein;

a first energy source for directing energy to a non-device side of the semiconductor substrate; and

a second energy source for directing pulse energy to a device side of the semiconductor substrate wherein the intensity of the energy directed from said first energy source is less than said second energy source and the duration of the applied pulse energy is in a range of about 1 microsecond to 3 seconds to control the depth of the junctions formed by impurities implanted in the semiconductor substrate and control the diffusion of the impurities through the substrate.

18. The semiconductor processing apparatus according to Claim 17, further comprising means for rotating the substrate during processing.

19. The semiconductor processing apparatus according to Claim 18, wherein said means for rotating is adapted to rotate the substrate in a range of about 5 rpm to 300 rpm.

20. The semiconductor processing apparatus according to Claim 19, wherein said pulse energy has a duration in a range of about 1 microsecond to 2 seconds.

21. The semiconductor processing apparatus according to Claim 20, wherein said pulse energy has a duration in a range of about 100 milliseconds to 400 milliseconds.

22. The semiconductor processing apparatus according to Claim 20, wherein said first energy source generates a peak energy at a wavelength in a range of about 0.2 microns to 3.0 microns.

23. The semiconductor processing apparatus according to Claim 22, wherein said second energy source generates a peak energy at a wavelength in a range of 0.2 microns to 0.90 microns.

24. The semiconductor processing apparatus according to Claim 23, wherein said first energy source comprises at least one tungsten halogen lamp.

25. The semiconductor processing apparatus according to Claim 24, wherein said first energy source comprises a plurality of tungsten halogen lamps.

26. The semiconductor processing apparatus according to Claim 25, wherein each of said lamps has a longitudinal extent, said longitudinal extents of a first group of lamps being generally parallel with the non-device side of the semiconductor substrate and being positioned at a first spacing from the non-device side of the semiconductor substrate and aligned over a perimeter region of the substrate to heat the perimeter region of the semiconductor substrate, said first group of heating lamps defining a first heating zone, a second group of said lamps positioned at a second spacing from the non-device side of the semiconductor substrate and positioned to extend across the substrate to heat a central region of the semiconductor substrate, said second group defining a second heating zone, and wherein said first spacing is less than said second spacing to create a varying temperature profile which is applied to the non-device side of the substrate.

27. The semiconductor processing apparatus according to Claim 26, wherein said second energy source generates a peak energy at a wavelength in a range of about 0.2 microns to 0.9 microns.

28. The semiconductor processing apparatus according to Claim 27, wherein said second energy source comprises at least one lamp chosen from a tungsten halogen lamp and a xenon lamp.

29. The semiconductor processing apparatus according to Claim 26, wherein said second energy source comprises at least one lamp tungsten halogen lamp.

30. The semiconductor processing apparatus according to Claim 29, wherein said second energy source comprises a plurality of tungsten halogen lamps.

31. The semiconductor processing apparatus according to Claim 29, further comprising a filter, said filter absorbing energy from said second energy source having a wavelength greater than about 0.7 microns.

32. The semiconductor processing apparatus according to Claim 31, said filter absorbing energy from said second energy source having a wavelength greater than about 0.9 microns.

33. The semiconductor processing apparatus according to Claim 31, wherein said filter comprises a fluid cooled filter.

34. A semiconductor processing apparatus comprising:

a housing defining a processing chamber therein, said processing chamber being adapted to rotatably support a semiconductor substrate therein;

means for heating the device side of the substrate to a heat activation temperature of at least 900° C;

means for controlling the depth of the junctions formed by impurities implanted in the semiconductor substrate and thereby limiting diffusion of the impurities through the substrate; and

means for limiting the thermoelastic stress in the substrate.

35. The semiconductor processing apparatus according to Claim 34, further comprising means for rotating the substrate during processing.

36. The semiconductor processing apparatus according to Claim 34, wherein said means for controlling includes pulsing said means for heating.

37. The semiconductor processing apparatus according to Claim 36, wherein said means for limiting the thermoelastic stresses includes heating the non-device side of the substrate to a reference temperature below said heat activation temperature.

38. A method of heating a semiconductor substrate comprising:

applying energy to a non-device side of the semiconductor substrate to heat the non-device side to a reference temperature; and

applying pulse energy to a device side of the semiconductor substrate wherein the intensity of the energy applied to the device side is greater than the intensity of the energy applied to the non-device side of the semiconductor substrate to control the depth of the junctions formed by impurities implanted in the semiconductor substrate and to limit the diffusion of the impurities through the substrate.

39. The method according to Claim 38, further comprising rotating the substrate during said applying.

40. The method according to Claim 38, wherein said rotating includes rotating the substrate in a range of about 5 rpm to 300 rpm.

41. The method according to Claim 38, wherein said applying includes applying said pulse energy over a duration in a range of about 1 microsecond to 2 seconds.

42. The method according to Claim 41, wherein said applying said pulse energy includes applying said pulse energy over a duration in a range of about 100 milliseconds to 400 milliseconds.

43. The method according to Claim 38, wherein said applying includes providing a first energy source and a second energy source, said first energy source generating a peak energy at a wavelength of about 0.2 microns to 3.0 microns, said first energy source applying said energy to the non-device side of the semiconductor substrate, and said second energy source generating a peak energy at a wavelength in a range of about 0.2 microns to 0.9 microns, said second energy source applying said pulse energy to said device side of said semiconductor substrate.

44. The method according to Claim 43, wherein said applying said pulse energy includes providing an energy source which emits a normal peak energy at a wavelength in a range of about 0.2 micron to 2.3 microns and shifting said peak energy to a wavelength in a range of about 0.2 microns to 0.9 microns.

45. The method according to Claim 44, wherein said shifting includes applying a biasing voltage to said energy source, said biasing voltage exceeding a normal operating voltage of said energy source.

46. The method according to Claim 38, wherein said applying energy to a non-device side of the semiconductor substrate includes applying energy to the non-device side of the semiconductor substrate to a temperature in a range of about 400° C to 900° C.

47. The method according to Claim 46, wherein said applying energy to the non-device side of the semiconductor substrate includes applying energy to the non-device side of the semiconductor substrate to a temperature in a range of about 500° C to 600° C.

48. The method according to Claim 38, wherein said applying pulse energy includes heating the device side of the semiconductor substrate to a temperature of greater than about 900° C.

49. The method according to Claim 48, wherein said heating includes heating to a temperature greater than 1000° C.

50. The method according to Claim 49, wherein said heating includes heating the device side to a temperature of about 1100° C.